

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
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International Bureau Seeks Comment on)	IB Docket No. 16-185
Recommendations Approved by World)	
Radiocommunication Conference)	WAC/069
Advisory Committee)	WAC/074
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COMMENTS OF SPACE EXPLORATION TECHNOLOGIES CORP.

Space Exploration Technologies Corp. (“SpaceX”) hereby comments on two draft recommendation proposals adopted by the World Radiocommunication Conference Advisory Committee (“WAC”) relating to non-geostationary orbit (“NGSO”) fixed satellite operations. The first would provide much needed guidance on ensuring compatibility between NGSO and geostationary orbit (“GSO”) systems in the 40/50 GHz range, under WRC-19 agenda item 1.6. The second would establish new rules relating to bringing into use (“BIU”) NGSO systems and would set a new schedule of NGSO deployment milestones, under WRC-19 agenda item 7, issue A. We address each proposal in turn, below.

AGENDA ITEM 1.6 — NGSO/GSO COMPATIBILITY

The 40/50 GHz range—often referred to as the V-band—is pivotal to SpaceX’s longer-term plans to deliver global high-speed internet service from a constellation of very low Earth orbit satellites. SpaceX is one of several operators with applications pending before the

Commission to launch and operate V-band satellites.¹ As the WAC recommendation notes, new technologies have made it possible for NGSO operators to use these frequencies far more intensively than had previously been possible, while protecting GSO operations from harmful interference.

One of the most significant regulatory obstacles to these new deployments, however, has been the lack of clear rules to structure the coordination and coexistence relationship between new NGSO systems and proposed higher-orbiting GSO satellite operators. While there may be technological methods to facilitate this efficient sharing of spectrum, international rules are needed to establish clear protection levels for GSO satellites and create specific engineering and design goals for new NGSO systems.

Without these clear guidelines, NGSO operators have faced significant additional regulatory uncertainty. For example, NGSO operators currently face the risk that, although their satellite design and operational strategies may be robust and fully protect proposed GSO systems in the V-band, regulators could later adopt still more stringent interference limits, forcing them to reconsider their plans, and potentially stranding investments and delaying deployment of constellations and the services they are intended to deliver. The clarification of rules recommended in WAC/069 can avoid chilling investment and impairing NGSO operators' ability to build systems to deliver high-speed broadband and other important applications using the 40/50 GHz band. As a provider to both GSO and NGSO FSS operations, SpaceX supports this consensus proposal since it not only offers additional flexibility for next generation NGSO

¹ See Space Exploration Holdings, LLC, Application for Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System, IBFS File No. SAT-LOA-20170301-00027 (filed Mar. 1, 2017).

systems but also proposes a means to monitor the aggregate effects from multiple NGSO systems to assure protections to next-generation GSO networks.

In addition to coexistence with eventual GSO systems in the V-band, the recommendation also proposes methods for protecting adjacent-band Earth Exploration Satellite Systems (“EESS”). SpaceX agrees that the protection of these systems is a critical consideration, and views the space sciences that those systems can deliver as a valuable advancement for future space exploration. However, the Commission should note that the WAC’s proposal advances only a single technological approach to achieving this protection goal: the use of filtering to comply with specified emissions limits.²

While filtering is one standard approach to preventing unwanted emissions from causing harmful interference, other techniques may be equally effective and make more efficient use of spectrum. For example, a system could steer its beams to physically avoid directing energy towards protected EESS receivers. In fact, such an approach could significantly improve efficiency by eliminating the need for all systems to comply with the proposed emissions limit—likely by reducing power, limiting their occupied bandwidth, or both—even when there is no risk of interference because the transmitter is not pointed towards the protected receiver. Therefore, although the proposed emissions limit may be a suitable default approach to preventing interference, regulators should err on the side of flexibility to allow NGSO systems to employ reliable alternative techniques of providing the same levels of robust protections for EESS.

² See IWG-3 Draft Proposal Agenda Item I.6, Doc. WAC/069, at 12-13, MOD USA/I.6/9 (Oct. 1, 2018).

AGENDA ITEM 7, ISSUE A — NGSO MILESTONES AND BIU RULES

Recommendation WAC/074 proposes revisions to the existing BIU framework to make it more suitable for NGSO systems, and to create a system of NGSO milestones. SpaceX strongly supports the goals of this proposal to establish BIU and milestone rules designed specifically for NGSO systems to avert spectrum warehousing and encourage timely deployments. However, the proposal should be revised in two narrow respects, both to better reflect the challenges of deploying next-generation NGSO systems and to further strengthen BIU requirements.

Most significantly, the WAC recommendation proposes to establish a 10% deployment milestone at two years after the end of the BIU period. Under this proposal, operators that cannot meet this added milestone would be required to reduce the size of their overall system to ten-times the size of the system as it is deployed at the 10% milestone date. The Commission should oppose this new proposed layer of the milestone proposal during the reconciliation process, on the basis that it would unnecessarily restrict operational flexibility at early deployment phases for NGSO operators, without adding notable confidence toward the goals of encouraging full constellation deployment. This early milestone has no foundation in any other ITU rule, and presents an unintended risk of encouraging hasty deployment in the first two years of deployment when operators may still be optimizing their manufacturing and launch approaches, in order to avoid the drastic consequence of significant reductions in the number of satellites they are permitted to deploy. It is not clear what certainty in intentions the 10% milestone would signal that would not already be resolved by the proposed 50% milestone in year five. In addition, a system of two milestones, rather than three, with 50% and 100% deployment deadlines, should be more than sufficient to deter warehousing, without the added risks of a further layer of even earlier milestones. Notably, the WAC recommendation's 10% milestone would be inconsistent

with the FCC’s rules, which impose only 50% and 100% milestone requirements, falling in years six and nine respectively.³

The construct of the proposed 10% deployment milestone is also flawed, carrying far harsher penalties for falling short than its 50% counterpart threshold. Under the current proposal, for each satellite by which an operator falls short of 10% deployment, the total system must be permanently reduced by ten-times that deficit. This makes an initial 10% milestone significantly more punitive than the second, 50% deployment milestone, where a shortfall results in reduction of overall system size by only two-times the deficit. It is unclear what policy objective this approach addresses.

The recommendation also proposes to shorten the requisite period of continuous operation in the current BIU rules from operation of a single satellite, in a single plane of an NGSO system, for a single day, in order for the entire NGSO system to be considered to have been brought into use.⁴ The proposal suggests shortening the 90-day period that applies to GSO systems to a single day. The rationale is that the 90-day period was designed to deter a GSO-specific technique for gaming the BIU rules, known as “satellite hopping,” which is considered to be less likely to happen with NGSO systems.

SpaceX supports this general rationale to shorten the period of operation, but urges the Commission to consider whether deployment and operation of one satellite for a single day alone would be sufficient to demonstrate *bona fide* deployment of an operational system. A slightly longer period in the range of 30 days would deter parties from attempting to bring their systems into “use” by simply launching into orbit a low-cost satellite not designed for extended operation

³ See 47 C.F.R. § 25.164(b).

⁴ See NTIA Draft Proposals, Doc. WAC/074, at 49, MOD USA/7A/5 (Sept. 21, 2018).

in space. This sort of limited deployment should not be considered a *bona fide* initiation of operations, but it could satisfy a requirement to only operate for a single day. By contrast, requiring continuous operations for at least 30 days would impose no practical burden on operators that truly intend to deploy operational NGSO systems, but could add meaningfully to deterring BIU claims based on the launch of a single satellite with very limited capabilities.

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SpaceX applauds the Commission for taking the lead in advancing policies to facilitate accelerated deployment of NGSO systems, taking advantage of new technologies to deliver high-speed internet and other critical services. The Commission's adoption of WAC/069 would establish clear, workable coexistence rules at the ITU for NGSO operations in the 40/50 GHz band. Likewise, SpaceX agrees that the ITU similarly should adopt modernized milestone and BIU rules that reflect the characteristics and needs of modern NGSO systems. These badly needed updates to ITU rules will lower regulatory barriers, promoting efficient use of scarce spectrum resources while protecting all users from harmful interference.

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